

cesses and hardware that runs or is controlled by the software processes. These components interact to provide program guide and program banner features such as those of the embodiments described below. The architecture illustrated in **FIG. 6** is characteristic of a personal video recorder that provides video recording and playback features, however other architectures may be implemented on alternative platforms such as personal computers and home media servers, as well as on set top boxes, televisions, and other devices that do not provide recording functions. The differences in the components required for different implementations will be apparent. In general, the devices in which embodiments of the invention are implemented are programmable devices that include a microprocessor, nonvolatile memory storing programming code for controlling the microprocessor and other hardware, rewritable nonvolatile memory such as flash memory for storing configuration data, random access memory for providing a working memory space, a video decoder, a digital signal processor, and one or more communication interfaces for receiving data or signals from, supplying data or signals to or exchanging data or signals with various external systems and devices.

[0042] The components of the video receiver device include components for interfacing with other devices and systems. One component is a remote control interface **50** that receives user-generated control signals. The control signals are typically transmitted by an infrared or RF remote control device, but may be transmitted by other types of devices and may be received through another type of interface such as a physical or wireless network interface. A video data receiver **52** receives video data from the system operator, and a metadata receiver **54** receives metadata. An ad receiver **56** receives data for advertisements and promotional material that may be displayed by the device, such as in program guides and program banners. A usage reporter **58** reports usage data such as viewing habits, program purchases and other transactions. In some instances multiple interface components will utilize the same interface hardware.

[0043] The video receiver also includes a number of components for managing various aspects of the device to provide features as described herein. A database manager **60** manages the flow of data into and out of a database. The database contains a variety of data including program and segment metadata, viewer preference data, program and segment affinity data representing a calculated viewer affinity for programs and segments, a reminder and alert schedule, a recording schedule, an index of recorded content, ad content for display by the device to viewers, and viewing habit data representing viewers' viewing and recording choices.

[0044] A video receiver manager **62** controls the video receivers or tuners of the device to select a channel to be tuned to and demodulated for viewing or recording. A video display manager **64** selects video sources such as channels of live signals and previously recorded content as input to a video decoder to produce an output signal for a display device. A user interface manager **66** controls the appearance and operation of graphical user interfaces presented to the user such as program guides, program banners and other user interfaces, examples of which are described below. An affinity calculator **68** calculates a level of viewer affinity for

programs, segments and ads based on viewer preferences defined by the viewer and metadata describing the programs, segments and ads. A viewer preference manager **70** receives input that defines the viewer's content preferences and maintains a viewer profile based on such input. The input may be direct viewer input or indirect viewer input such as viewing and recording habits. A recording manager **72** controls the scheduling and recording of video programs and program segments in response to automated and manual recording selections, and an alert manager **74** controls the viewer scheduling of reminders and the automated scheduling of alerts for programs and segments of interest to the viewer. Details concerning the creation of viewer profiles, their use in determining the viewer's affinity for particular content using program and segment metadata, and the automated scheduling of recordings and alerts based on those affinity levels are provided in the patent application incorporated above.

[0045] The receiver device components further include an ad manager **76** that controls the receipt of locally displayed advertisements and their selection for display in the program guide, in program banners, and at other times. The manner of ad selection may be arbitrary, may be based on relevance to a currently selected program or segment, or may be based on viewer affinity to the subject matter of the ad. In addition, a viewing habit monitor **78** generates and stores data indicating the viewing and recording habits of users of the device. This data may be used for purposes of updating viewer preferences and may be exported as usage data to services for establishing the size and composition of viewing audiences for programs and program segments.

[0046] The components shown in **FIG. 6** interact to produce interactive program guides, interactive program banners and other features as described with respect to the following embodiments. The person of ordinary skill in the art will be capable of selecting hardware and producing programming code to implement the components of **FIG. 6** or alternative components to produce the features of the following embodiments as well as various enhancements and alterations of those features that will become apparent from their description.

[0047] **FIGS. 7a** and **7b** show a set of typical user commands supported by the interactive program guides illustrated below, and actions performed in response to those commands by the device that generates the program guides. A first user command is to display the program guide. This command is typically issued by pressing an information or display key on a remote control. Upon receiving this command, the device retrieves metadata objects corresponding to given time and channel parameters. These parameters are typically determined by the current time and the current channel to which the device is tuned, but the viewer may also be provided with the option of specifying times and channels. Based on the retrieved metadata objects, the guide is then assembled and displayed. Assembly and display of the guide may include forming a grid of fields for individual programs and program segments, displaying a cursor in the field of the current program or segment, displaying information for the program on which the cursor is located, and displaying information for the segment (if any) on which the cursor is located.

[0048] Another user command is to move the cursor. This command is typically issued by pressing arrow keys or page